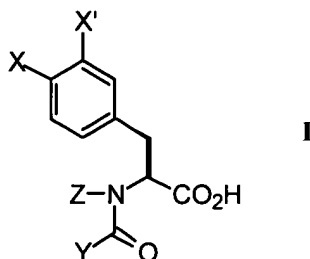


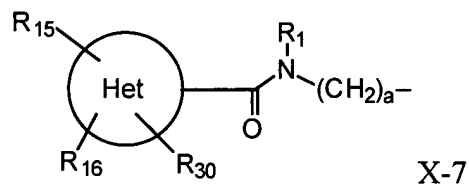
Claims:

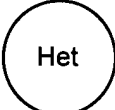
1. A compound of the formula:



wherein:

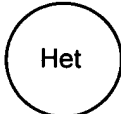
one of X and X' is hydrogen, halogen, or lower alkyl, and the other is a group of the formula:



wherein  is a 5- or 6-membered heteroaromatic ring containing 1, 2 or 3

heteroatoms selected from N,O, and S;

or

 is a 9- or 10-membered bicyclic heteroaromatic ring containing 1, 2, 3 or 4

heteroatoms selected from O, S, and N,

a is 0 or 1,

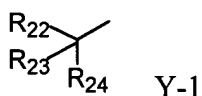
R₁ is hydrogen or lower alkyl,

R₁₅ is hydrogen, halogen, nitro, lower alkyl sulfonyl, cyano, lower alkyl, lower alkoxy, lower alkoxy carbonyl, carboxy, lower alkyl aminosulfonyl, perfluorolower alkyl, lower alkylthio, hydroxy lower alkyl, alkoxy lower alkyl, alkylthio lower alkyl, alkylsulfinyl lower alkyl, alkylsulfonyl lower alkyl, lower alkylsulfinyl, lower alkanoyl, aroyl, aryl, aryloxy or a group of the formula R₁₇-C≡C-,

and R₁₆ is hydrogen, halogen, nitro, cyano, lower alkyl, OH, perfluorolower alkyl, or lower alkylthio, and

R₃₀ is hydrogen or lower alkyl, or is absent; and

Y is a group of the formula:

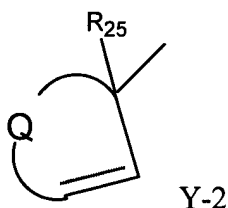


wherein:

R₂₂ and R₂₃ are independently aryl, heteroaryl or lower alkyl which is unsubstituted or substituted by one or more chloro, bromo, nitro, hydroxy, lower alkoxy, aryl, lower alkanoyl, aroyl or cyano,

R₂₄ is aryl, cyano, alkylsulfonyl or lower alkyl or alkenyl unsubstituted or substituted by an aryl or heteroaryl ring, and when R₂₂ is aryl and R₂₃ is aryl or lower alkyl, hydrogen, and the total number of carbon atoms in R₂₂, R₂₃ and R₂₄ is from 6 to 14; or

Y is a 3-7 membered ring of the formula:



wherein:

R₂₅ is lower alkyl, unsubstituted or fluorine substituted lower alkenyl, or a group of formula R₂₆-(CH₂)_e-,

R₂₆ is aryl, heteroaryl, azido, cyano, hydroxy, lower alkoxy, lower alkoxy carbonyl, lower alkanoyl, lower alkylthio, lower alkyl sulfonyl, lower alkyl sulfinyl, perfluoro lower alkanoyl, nitro, or R₂₆ is a group of formula -NR₂₈R₂₉, wherein:

R₂₈ is hydrogen or lower alkyl,

R₂₉ is hydrogen, lower alkyl, lower alkoxy carbonyl, lower alkoxy carbonylaminocarbonyl, lower alkanoyl, aroyl, heteroaroyl, perfluoro lower alkanoyl, lower alkyl sulfonyl, lower alkylaminocarbonyl, arylaminocarbonyl, heterocycloalkyl carbonyl, lower alkylaminothiocarbonyl, or

R₂₈ and R₂₉ taken together with the nitrogen atom to which they are attached form a 4, 5 or 6-membered saturated heterocyclic ring containing one or two heteroatoms with the second heteroatom being O, S, or N-R₂₇;

Q is -(CH₂)_f O-, -(CH₂)_f S-, -(CH₂)_f-, or when f=0, a bond,

R₂₇ is hydrogen, lower alkyl, aryl, lower alkanoyl, aroyl, or lower alkoxy carbonyl;

the carbon atoms in said ring are unsubstituted or substituted by lower alkyl or halogen,

e is an integer from 0 to 4, and

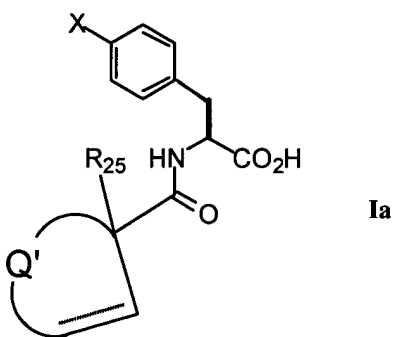
f is an integer from 0 to 3; and

Z is hydrogen or lower alkyl;

and the pharmaceutically acceptable salts and esters thereof.

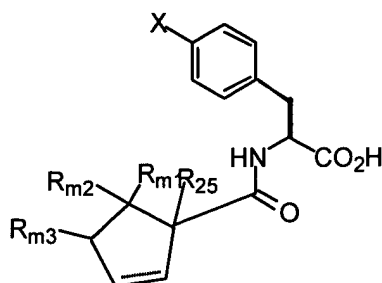
2. The compound of claim 1 wherein X' is hydrogen.

3. The compound of claim 2 having the formula:



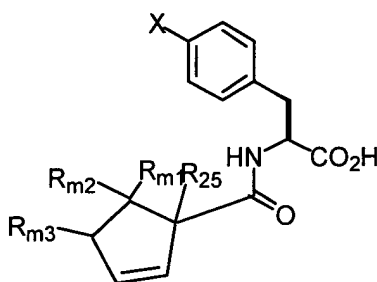
wherein Q' is unsubstituted or lower alkyl substituted -(CH₂)_f-, f is 1, 2 or 3, and X and R₂₅ are as in claim 1.

4. The compound of claim 3 wherein f is 2 whereby said compound is of the formula:



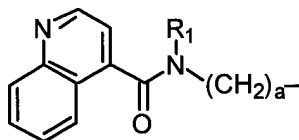
wherein R_{m1} , R_{m2} and R_{m3} are independently hydrogen or lower alkyl, and R_{25} is lower alkyl, lower alkenyl which is unsubstituted or substituted by fluorine, or a group of the formula $R_{26}-(CH_2)_e-$ wherein R_{26} and e are as in claim 1.

5. The compound of claim 4 wherein said compound is of the formula:



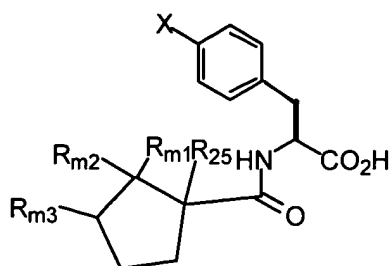
wherein R_{m1} , R_{m2} and R_{m3} and R_{25} are as in claim 4.

6. The compound of claim 4 wherein X is a group of the formula:



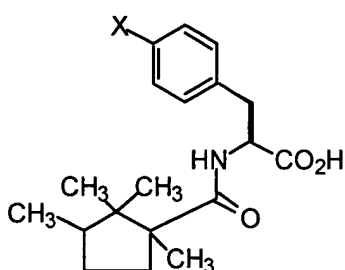
7. The compound of claim 6 wherein a is 0.

8. The compound of claim 4 wherein said compound is of the formula:

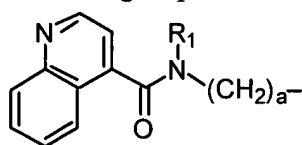


wherein R_{m1} , R_{m2} and R_{m3} and R_{25} are as in claim 4.

9. The compound of claim 8 wherein said compound is of the formula:

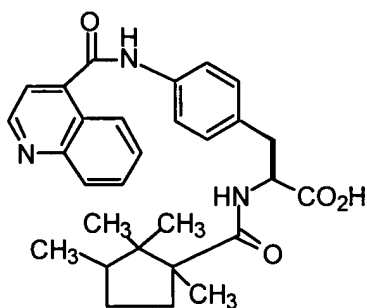


10. The compound of claim 9 wherein X is a group of the formula:



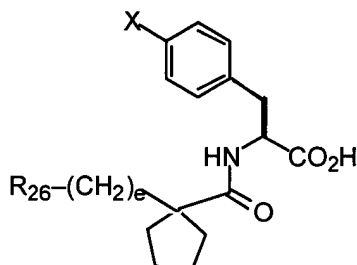
11. The compound of claim 10 wherein a is 0.

12. The compound of claim 11 having the formula:



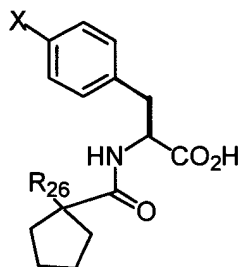
13. The compound of claim 8 wherein R_{m1} , R_{m2} and R_{m3} are all hydrogen, and R_{25} is lower alkyl or lower alkenyl which is unsubstituted or substituted by fluorine.

14. The compound of claim 4 having the formula:



wherein X, R_{26} and e are as in claim 1.

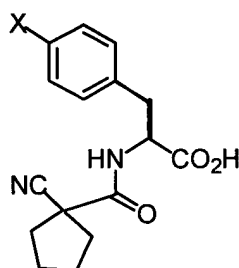
15. The compound of claim 14 wherein e is 0 whereby said compound is of the formula:



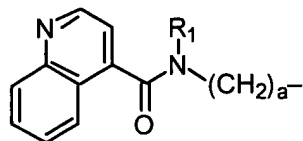
16. The compound of claim 15 wherein R_{26} is cyano or aryl.

17. The compound of claim 16 wherein R_{26} is cyano or phenyl which is unsubstituted or mono-substituted by halogen, lower alkyl or lower alkoxy.

18. The compound of claim 17 wherein said compound is of the formula:



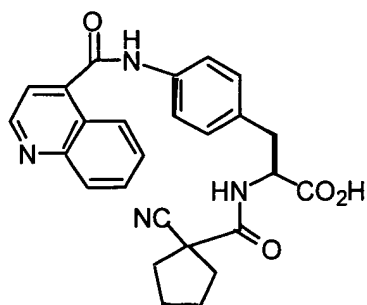
19. The compound of claim 18 wherein X is a group of the formula:



wherein R₁ and a are as in claim 1.

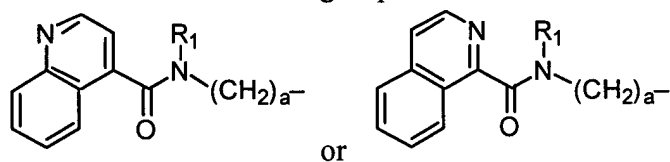
20. The compound of claim 19 wherein a is 0.

21. The compound of claim 20 having the formula:

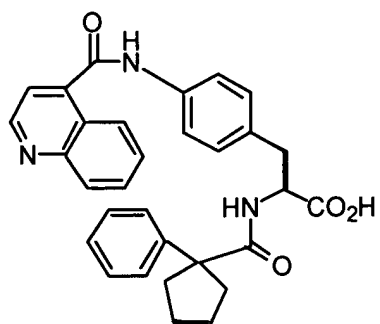


22. The compound of claim 17 wherein R₂₆ is phenyl which is unsubstituted or mono-substituted by halogen, lower alkyl or lower alkoxy.

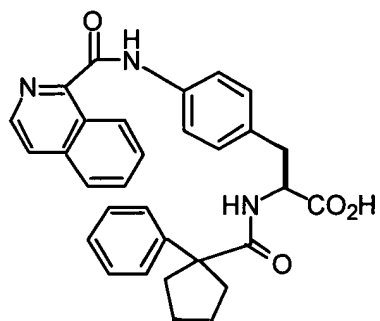
23. The compound of claim 22 wherein X is a group of the formula:



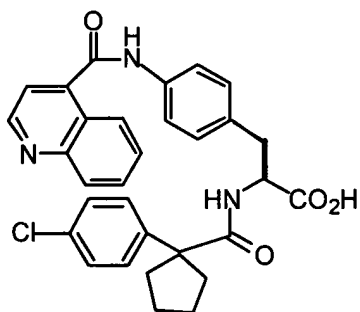
24. The compound of claim 23 wherein a is 0.



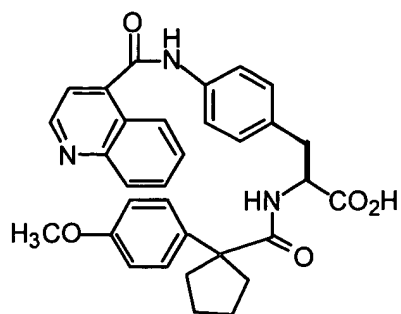
26. The compound of claim 24 having the formula:



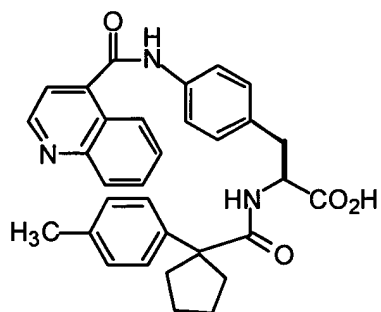
27. The compound of claim 24 having the formula:



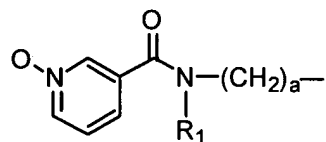
28. The compound of claim 24 having the formula:



29. The compound of claim 24 having the formula:



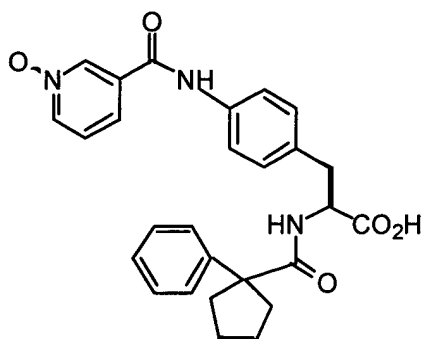
30. The compound of claim 22 wherein X is a group of the formula:



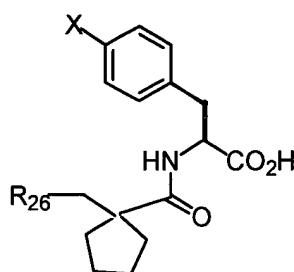
wherein R_1 and a are as in claim 1.

31. The compound of claim 30 wherein a is 0.

32. The compound of claim 31 having the formula:



33. The compound of claim 14 wherein e is 1 whereby said compound is of the formula:



34. The compound of claim 33 wherein R_{26} is lower alkoxy or aryl.

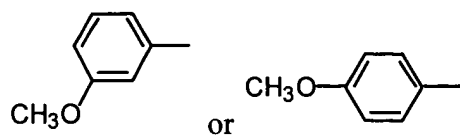
35. The compound of claim 34 wherein R_{26} is methoxy, or is phenyl which is unsubstituted, mono-substituted by halogen, lower alkoxy, cyano or tetrazolyl which tetrazolyl is unsubstituted or monosubstituted by methyl, or disubstituted by lower alkoxy.

36. The compound of claim 35 wherein R_{26} is methoxy.

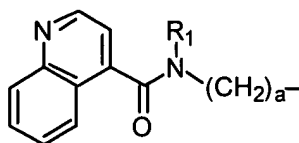
37. The compound of claim 35 wherein R_{26} is phenyl which is mono- or di-substituted by lower alkoxy.

38. The compound of claim 37 wherein R_{26} is phenyl which is mono-substituted by lower alkoxy.

39. The compound of claim 38 wherein R₂₆ is a group of the formula:

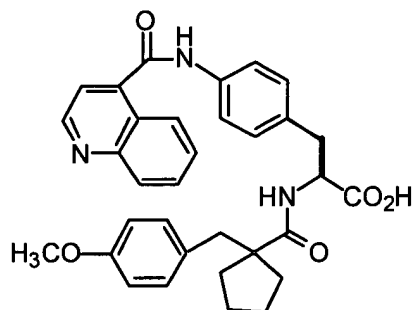


40. The compound of claim 39 wherein X is a group of the formula:



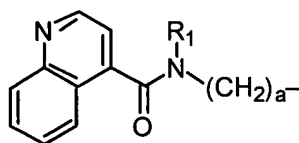
41. The compound of claim 40 wherein a is 0.

42. The compound of claim 41 having the formula:



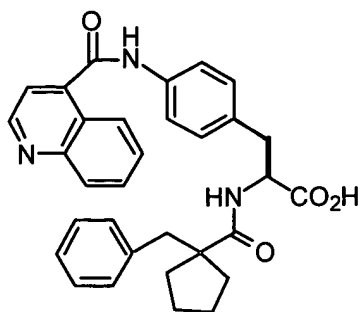
43. The compound of claim 35 wherein R₂₆ is unsubstituted phenyl.

44. The compound of claim 43 wherein X is a group of the formula:



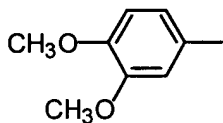
45. The compound of claim 44 wherein a is 0.

46. The compound of claim 45 having the formula:



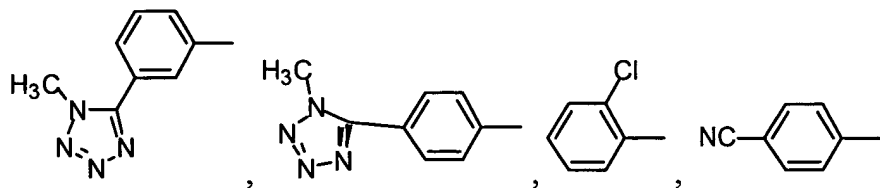
47. The compound of claim 37 wherein R_{26} is phenyl which is di-substituted by lower alkoxy.

48. The compound of claim 47 wherein R_{26} is a group of the formula:



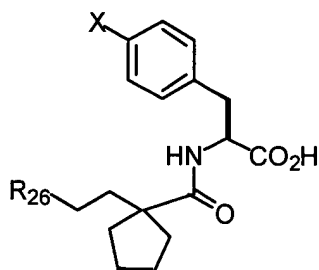
49. The compound of claim 35 wherein R_{26} is phenyl monosubstituted by chloro, tetrazolyl, which is unsubstituted or mono-substituted by methyl, or cyano.

50. The compound of claim 49 wherein R_{26} is a group of the formula:



51. The compound of claim 33 wherein R_{26} is tetrazolyl or cyano.

52. The compound of claim 14 wherein e is 2 whereby said compound is of the formula:



53. The compound of claim 52 wherein R₂₆ is -NR₂₈R₂₉ where R₂₈ and R₂₉ are as in claim 1.

54. The compound of claim 53 wherein R₂₈ and R₂₉ are independently hydrogen or lower alkyl.

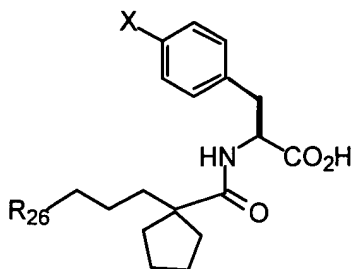
55. The compound of claim 53 wherein R₂₈ is hydrogen and R₂₉ is lower alkoxy, lower alkylsulfonyl, heterocycloalkyl, aroyl or heteroaroyl.

56. The compound of claim 53 wherein R₂₈ is lower alkyl and R₂₉ is lower alkanoyl, lower alkoxy, lower alkylaminocarbonyl or lower alkylaminocarbonyl.

57. The compound of claim 53 wherein R₂₈ and R₂₉ taken together with the nitrogen atom to which they are attached form a morpholinyl group.

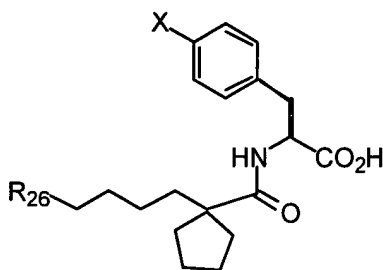
58. The compound of claim 52 wherein R₂₆ is lower alkyl sulfonyl, lower alkyl thio, lower alkyl sulfinyl, lower alkylthio, azido, cyano, hydroxy, lower alkoxy, lower alkanoyl or lower alkanoylamino.

59. The compound of claim 14 wherein e is 3 whereby said compound is of the formula:



60. The compound of claim 59 wherein R₂₆ is lower alkyl sulfonyl, lower alkyl sulfinyl, lower alkylthio, azido, cyano, hydroxy, lower alkoxy, lower alkanoyl or lower alkanoylamino.

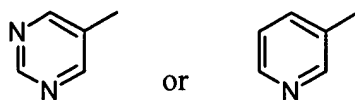
61. The compound of claim 14 wherein e is 4 whereby said compound is of the formula:



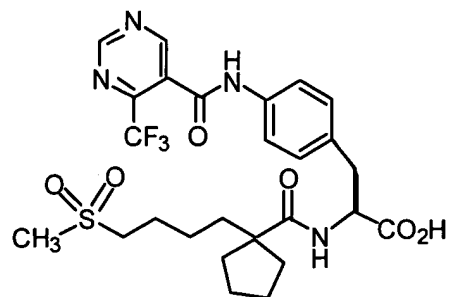
62. The compound of claim 61 wherein R₂₆ is lower alkyl sulfonyl, lower alkyl sulfinyl, lower alkylthio, azido, cyano, hydroxy, lower alkoxy, lower alkanoyl or lower alkanoylamino.

63. The compound of claim 62 wherein a is 0, R₁ is hydrogen and R₂₆ is lower alkyl sulfonyl.

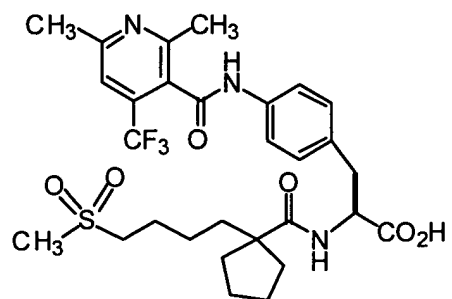
64. The compound of claim 63 wherein Het is a 6-membered heteroaromatic ring of the formula:



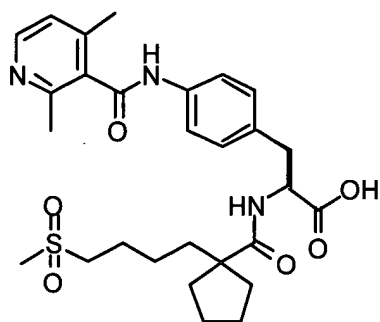
65. The compound of claim 64 having the formula:



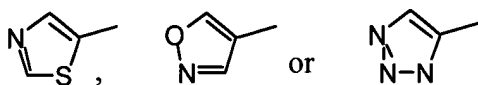
66. The compound of claim 64 having the formula:



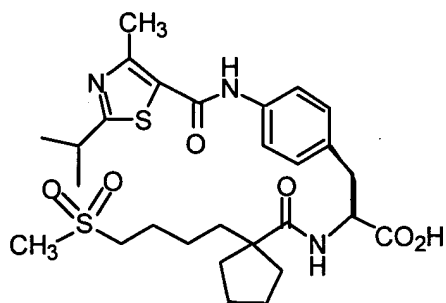
67. The compound of claim 64 having the formula:



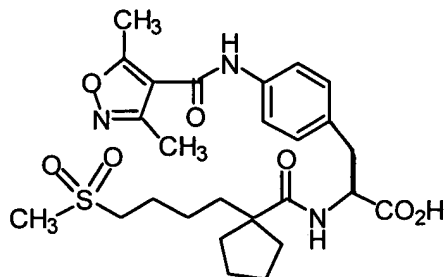
68. The compound of claim 63 wherein Het is a 5-membered heteroaromatic ring of the formula:



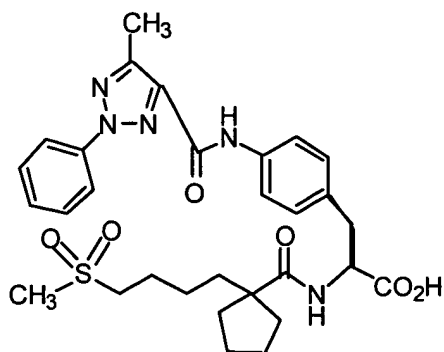
69. The compound of claim 68 having the formula:



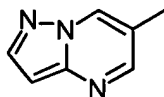
70. The compound of claim 68 having the formula:



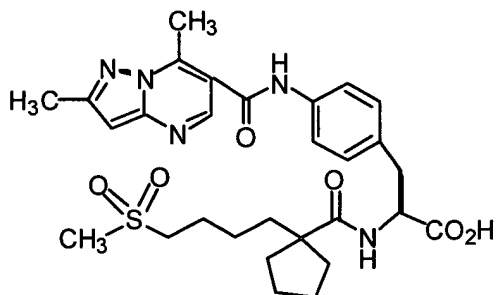
71. The compound of claim 68 having the formula:



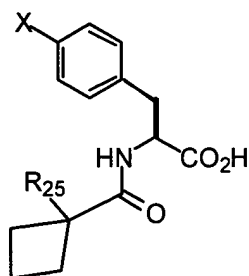
72. The compound of claim 63 wherein Het is a 9-membered heteraromatic ring of the formula:



73. The compound of claim 72 having the formula:



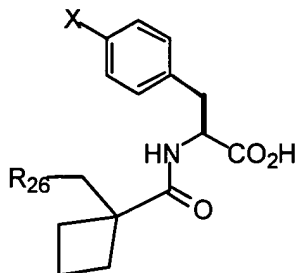
74. The compound of claim 3 wherein f is 1 whereby said compound is of the formula:



wherein R_{25} is lower alkyl or a group of the formula $R_{26}-(CH_2)_e-$ wherein R_{26} and e are as in claim 1.

75. The compound of claim 74 wherein R_{25} is a group of the formula $R_{26}-(CH_2)_e-$.

76. The compound of claim 75 wherein e is 1 whereby said compound is of the formula:

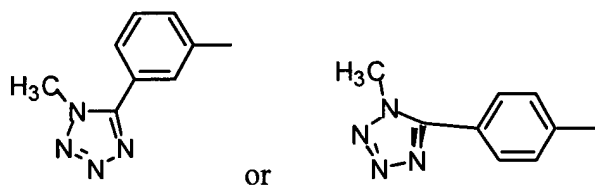


77. The compound of claim 76 wherein R_{26} is lower alkoxy or aryl.

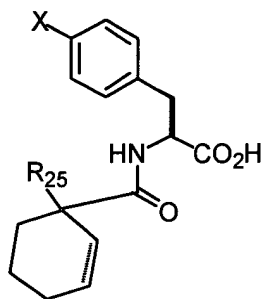
78. The compound of claim 77 wherein R_{26} is methoxy or phenyl which is unsubstituted, mono-substituted by halogen, lower alkoxy, cyano or tetrazolyl which tetrazolyl is unsubstituted or monosubstituted by methyl, or disubstituted by lower alkoxy.

79. The compound of claim 78 wherein R_{26} is phenyl which is monosubstituted by tetrazolyl which tetrazolyl is monosubstituted by methyl.

80. The compound of claim 79 wherein R_{26} is of the formula:

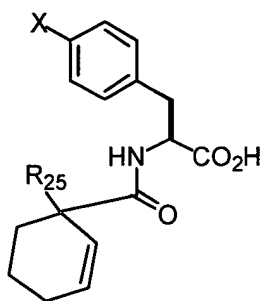


81. The compound of claim 3 wherein f is 3 and said compound is of the formula:



wherein R₂₅ and X are as in claim 1.

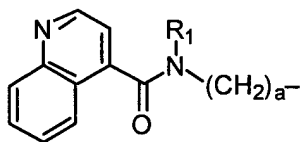
82. The compound of claim 81 wherein said compound is of the formula:



wherein R₂₅ and X are as in claim 1.

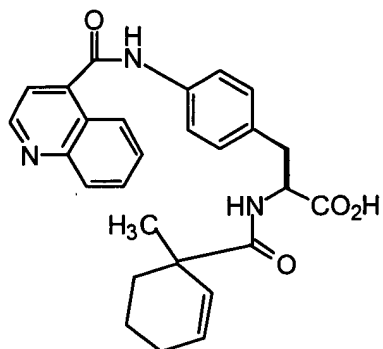
83. The compound of claim 82 wherein R₂₅ is lower alkyl.

84. The compound of claim 83 wherein X is a group of the formula:

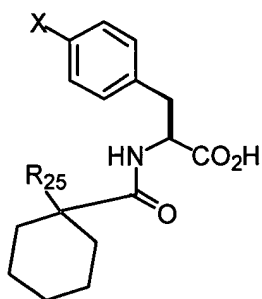


85. The compound of claim 84 wherein a is 0.

86. The compound of claim 85 having the formula:



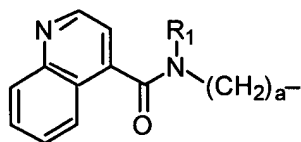
87. The compound of claim 81 wherein said compound is of the formula:



wherein R_{25} and X are as in claim 1.

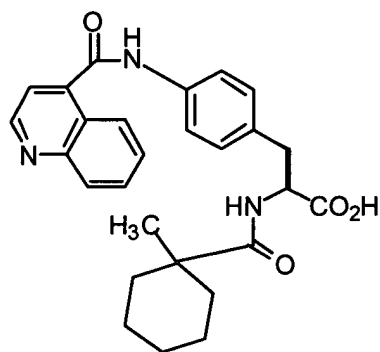
88. The compound of claim 87 wherein R_{25} is lower alkyl.

89. The compound of claim 88 wherein X is a group of the formula:



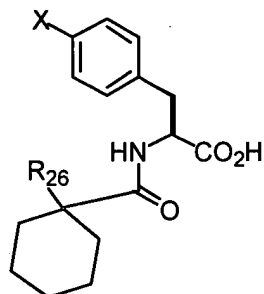
90. The compound of claim 89 wherein a is 0.

91. The compound of claim 90 having the formula:



92. The compound of claim 87 wherein R_{25} is a group of the formula $R_{26}-(CH_2)_e-$ wherein R_{26} and e are as in claim 1.

93. The compound of claim 92 wherein e is 0 whereby said compound is of the formula:

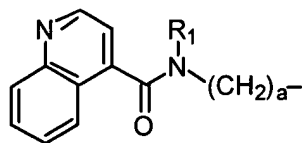


94. The compound of claim 93 wherein R_{26} is lower alkoxy or aryl.

95. The compound of claim 94 wherein R_{26} is methoxy, or is phenyl which is: 1) unsubstituted, 2) mono-substituted by halogen, lower alkoxy, cyano or tetrazolyl which tetrazolyl is unsubstituted or monosubstituted by methyl, or 3) disubstituted by lower alkoxy.

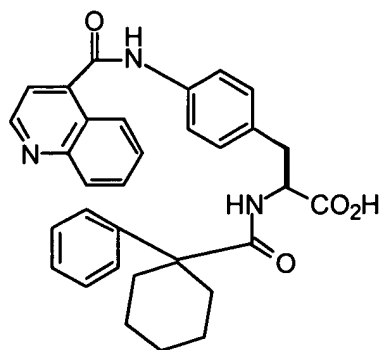
96. The compound of claim 95 wherein R_{26} is phenyl which is unsubstituted or mono-substituted by lower alkoxy.

97. The compound of claim 96 wherein X is a group of the formula:

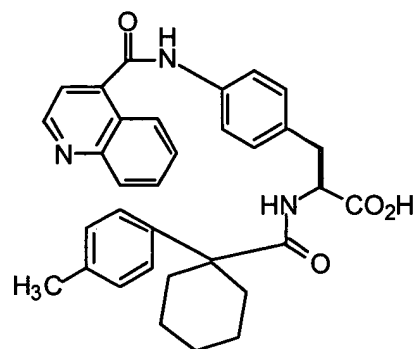


98. The compound of claim 97 wherein a is 0.

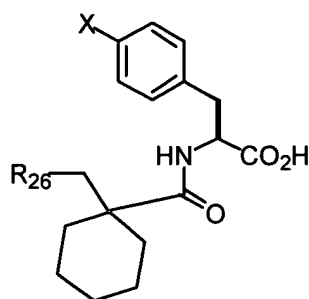
99. The compound of claim 98 having the formula:



100. The compound of claim 98 having the formula:



101. The compound of claim 92 wherein e is 1 whereby said compound is of the formula:



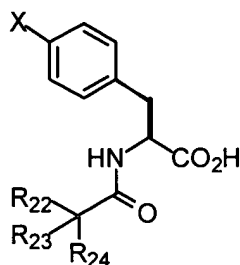
102. The compound of claim 101 wherein R₂₆ is lower alkoxy or aryl.

103. The compound of claim 102 wherein R₂₆ is methoxy, or is phenyl which is:

1) unsubstituted, 2) mono-substituted by halogen, lower alkoxy, cyano or tetrazolyl which tetrazolyl is unsubstituted or monosubstituted by methyl, or 3) disubstituted by lower alkoxy.

104. The compound of claim 103 wherein R₂₆ is phenyl which is unsubstituted or mono-substituted by lower alkoxy.

105. The compound of claim 1 having the formula:

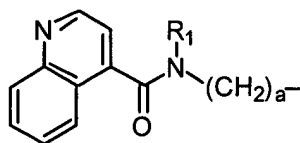


wherein X, R₂₂, R₂₃ and R₂₄ are as in claim 1.

106. The compound of claim 105 wherein R₂₂ and R₂₃ are independently unsubstituted phenyl or lower alkyl, and R₂₄ is hydrogen or unsubstituted lower alkyl or alkenyl.

107. The compound of claim 106 wherein R₂₂, R₂₃ and R₂₄ are lower alkyl.

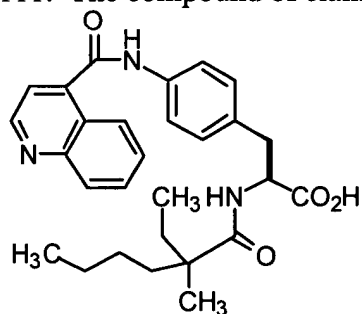
108. The compound of claim 107 wherein X is a group of the formula:



109. The compound of claim 108 wherein a is 0.

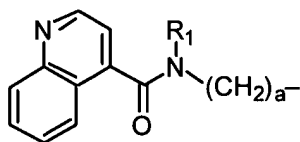
110. The compound of claim 108 wherein R_{22} is methyl, R_{23} is ethyl and R_{24} is n-butyl.

111. The compound of claim 110 having the formula:



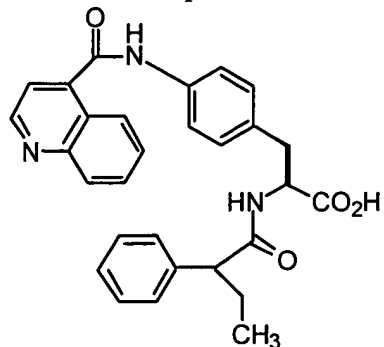
112. The compound of claim 106 wherein R_{22} is unsubstituted phenyl, R_{23} is lower alkyl and R_{24} is hydrogen.

113. The compound of claim 112 wherein X is a group of the formula:

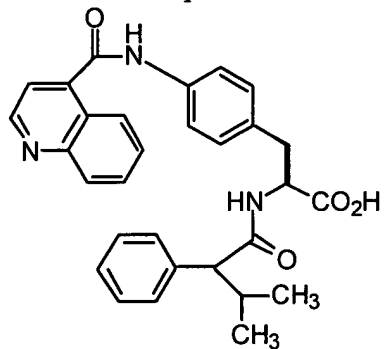


114. The compound of claim 113 wherein a is 0.

115. The compound of claim 114 having the formula:

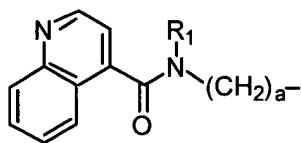


116. The compound of claim 114 having the formula:



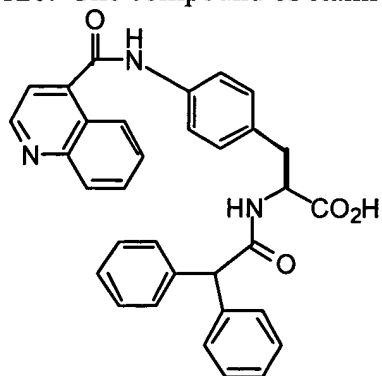
117. The compound of claim 106 wherein R_{22} and R_{23} are unsubstituted phenyl and R_{24} is hydrogen.

118. The compound of claim 117 wherein X is a group of the formula:

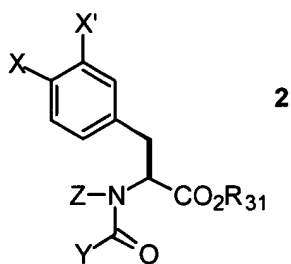


119. The compound of claim 118 wherein a is 0.

120. The compound of claim 119 having the formula:



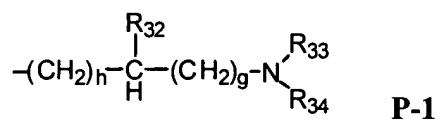
121. The compound of claim 1 which is an ester of the formula:



wherein:

R_{31} is lower alkyl; or

R_{31} a group of formula:



wherein:

R_{32} is hydrogen or lower alkyl,

R_{33} is hydrogen, lower alkyl, or aryl,

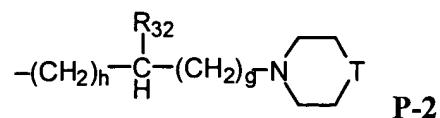
R_{34} is hydrogen or lower alkyl,

h is an integer from 0 to 2,

g is an integer from 0 to 2, and

the sum of h and g is 1 to 3; or

R₃₁ is a group of formula:



wherein:

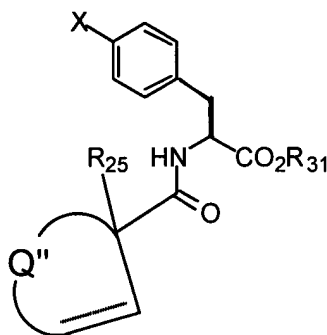
R₃₂, g, and h are as above for P-1,

T is O, S, -(CH₂)_j-, a group of the formula N-R₃₅, or when j=0, a bond,

R₃₅ is hydrogen, lower alkyl, lower alkanoyl, or lower alkoxy carbonyl, and
j is 0, 1 or 2

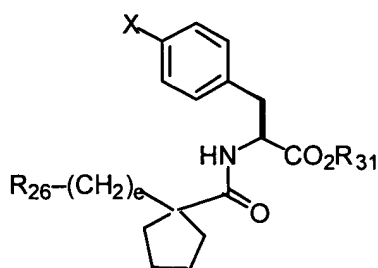
and wherein X, X' Y and Z are as in claim 1.

122. The compound of claim 121 having the formula:



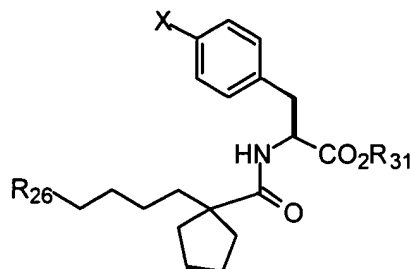
wherein Q'' is unsubstituted or lower alkyl substituted -(CH₂)_f-, f is 1, 2 or 3, and X and R₂₅ are as in claim 1.

123. The compound of claim 122 having the formula:



wherein X, R₂₆ and e are as in claim 1.

124. The compound of claim 123 wherein e is 4 whereby said compound is of the formula:

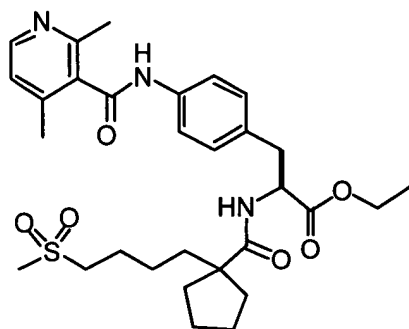


125. The compound of claim 124 wherein R₂₆ is lower alkyl sulfonyl, lower alkyl thio, lower alkyl sulfinyl, lower alkylthio, azido, cyano, hydroxy, lower alkoxy, lower alkanoyl or lower alkanoylamino.

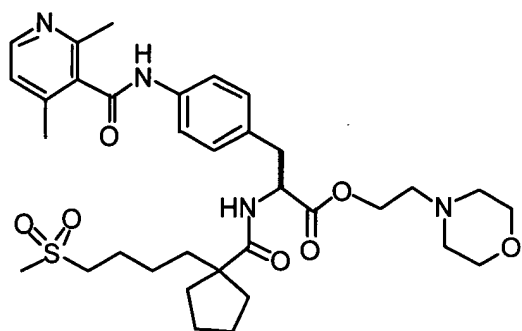
126. The compound of claim 125 wherein a is 0, R₁ is hydrogen, R₂₆ is lower alkyl sulfonyl or lower alkoxy and Het is pyridyl.

127. The compound of claim 126 wherein R₃₁ is ethyl, 2-(N,N-diethylamino)ethyl or 2-(4-morpholinyl)ethyl.

128. The compound of claim 127 having the formula:

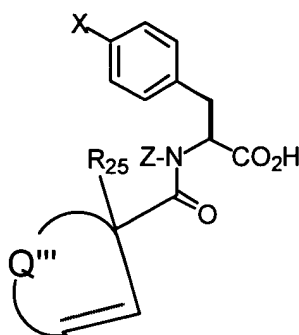


129. The compound of claim 127 having the formula:



130. The compound of claim 1 wherein Z is lower alkyl.

131. The compound of claim 130 having the formula:



wherein Q''' is unsubstituted or lower alkyl substituted $-(CH_2)_f$, f is 1, 2 or 3, and X and R_{25} are as in claim 1.

132. The compound of claim 131 having the formula:

